

<p style="text-align: center;">U.S. DEPARTMENT OF TRANSPORTATION</p> <p style="text-align: center;">FEDERAL AVIATION ADMINISTRATION</p> <p style="text-align: center;">TYPE CERTIFICATE DATA SHEET E34NE</p>	<p style="text-align: right;">TCDS NUMBER E34NE REVISION: 4* DATE: JULY 20, 2001</p> <p>TURBOMECA</p> <p>MODELS: ARRIUS 1A ARRIUS 2F ARRIUS 2B1 ARRIUS 2K1 ARRIUS 2B1A</p>
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Engines of models described herein conforming with this data sheet (which is part of Type Certificate Number E34NE) and other approved data on file with the Federal Aviation Administration, meet the minimum standards for use in certificated aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations, provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER Turbomeca S.A.
64 511 Bordes Cedex
France

I. MODELS	ARRIUS 1A	ARRIUS 2B1	ARRIUS 2B1A	ARRIUS 2F	ARRIUS 2K1
TYPE	Twin spool (free turbine engine); turboshaft engine for helicopters; single stage centrifugal compressor; annular reverse flow combustion chamber; single gas generator turbine; single stage power turbine (free turbine); reduction gearbox.				
RATINGS (See NOTE 8)			w/o TU45* w/ TU45*		
2 1/2 minute rating shp (kw)	520 (388)	577 (430)	658 (491) 705 (526)	629 (469)	676(504)
Continuous OEI rating	---	577 (430)	613 (457) 498 (371)	569 (424)	676(504)
30 minute rating shp (kw)	479 (357)	---	---	---	---
Takeoff shp (kw)	456 (340)	577 (430)	613 (457) 498 (371)	432 (322)	676(504)
Maximum continuous shp (kw)	397 (296)	547 (408)	547 (408) 414 (309)	432 (322)	579(432)
* See Note 23					
FUEL (See NOTE 15)					
FUEL CONTROL	Turbomeca full authority digital electronic control system with manual backup mode for the Arrius 1A, Arrius 2B1 and Arrius 2B1A and Arrius 2K1. For the Arrius 2F the fuel control system is ensured by a hydromechanical control with manual mode.				
OIL (See NOTE 14)					
PRINCIPAL DIMENSIONS					
Length, in (mm)	63 (1601)	45.6 (1158)	-- --	55.9 (1418)	38.3 (973)
Width, in (mm)	17.2 (436)	20.4 (518)	-- --	19.3 (488)	21.2 (538)
Height, in (mm)	23.4 (586)	27.2 (690)	-- --	26.6 (674)	25.1 (638)
CENTER OF GRAVITY	Refer to Installation Manual.				
WEIGHT (dry) pounds (kg), maximum)	ARRIUS 1A 223.3 (101.3)	ARRIUS 2B1 246.9 (112)	ARRIUS 2B1A 246.9 (112)	ARRUIS 2F 228.1 (103.5)	ARRIUS 2K1 248.7(112.8)

Refer to Installation Manual, for definition of engine dry weight

DRIVE SHAFT TYPE Refer to Installation Manual.

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LEGEND: "- ." INDICATES "SAME AS PRECEDING MODEL"

"---" INDICATES "DOES NOT APPLY"

NOTICE: ALL PAGES ARE REFORMATTED. SIGNIFICANT CHANGES, IF ANY
ARE BLACK-LINED IN THE LEFT MARGIN.

IGNITION	Low tension, high energy system including: - Twin output (one high energy generator) - 2 injectors - 2 ignitors																			
STARTING (See NOTE 7)	Starting system including electro-valve.																			
CERTIFICATION BASIS	<p>FAR 21.29 and FAR 33 effective February 1, 1965, and Amendments 33-1 through Amendment 33-12. ARRIUS 2B1, 2B1A and 2F, 2K1 complies with Amendments 33-1 through 33-14, and Amendment 33-15 § 33.28 and Amendment 33-18 § 33.88 for ARRIUS 2B1A and 2K1.</p> <p>Type Certificate Number E34NE, issued November 8, 1990.</p> <table> <tr> <th>Model Number</th><th>Effective Date of TC Application</th><th>Date Model Added to TC</th></tr> <tr> <td>ARRIUS 1A</td><td>December 21, 1989</td><td>November 8, 1990</td></tr> <tr> <td>ARRIUS 2F</td><td>November 25, 1996</td><td>September 26, 1997</td></tr> <tr> <td>ARRIUS 2B1</td><td>April 14, 1997</td><td>November 24, 1997</td></tr> <tr> <td>ARRIUS 2K1</td><td>June 20, 1997</td><td>July 20, 2001</td></tr> <tr> <td>ARRIUS 2B1A</td><td>April 6, 1999</td><td>July 20, 2001</td></tr> </table> <p>The ARRIUS 2B has been deleted from the Type Certificate as of July 20, 2001. All Arrius 2B engines were retrofitted to ARRIUS engine model 2B1</p>		Model Number	Effective Date of TC Application	Date Model Added to TC	ARRIUS 1A	December 21, 1989	November 8, 1990	ARRIUS 2F	November 25, 1996	September 26, 1997	ARRIUS 2B1	April 14, 1997	November 24, 1997	ARRIUS 2K1	June 20, 1997	July 20, 2001	ARRIUS 2B1A	April 6, 1999	July 20, 2001
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IMPORT REQUIREMENTS	<p>To be considered eligible for installation on U.S. registered aircraft, each engine to be exported to the United States shall be accompanied by a Certificate of Airworthiness for export endorsed by the Direction Generale de l'Aviation Civile (DGAC) which contains the following language:</p> <ol style="list-style-type: none"> 1. This engine conforms to United States Type Certificate Number E34NE and is in a condition for safe operation. 2. This engine has been subjected by the manufacturer to a final operational check and is in a proper state of airworthiness. <p>Reference FAR Section 21-500 which provides the airworthiness acceptance of aircraft engines or propellers manufactured outside the U.S. for which a U.S. type certificate has been issued.</p>																			

NOTES

NOTE 1. Permissible Engine Speeds:A. Maximum gas generator speed, rpm (Ng)

	<u>ARRIUS</u> <u>1A</u>	<u>ARRIUS</u> <u>2B1</u>	<u>ARRIUS</u> <u>2B1A</u>	<u>ARRIUS</u> <u>2F</u>	<u>ARRIUS</u> <u>2K1</u>
2 1/2 minute rating	56,140	56,113	--	55308	56113
OEI continuous rating	---	54,706	--	---	54706
30 minute rating	55,300	---	---	---	---
Takeoff rating	54,685	54,706	--	54,658	54706
Maximum continuous	53,285	53,406	--	53,847	53406
Transient overspeed (5 sec. Limit)	56,280	56,823	--	56,065 (20 sec.)	56823

Refer to Installation Manual for variation of these limits with ambient conditions.

Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.

100% = 54,117 rpm

B. Power Shaft Speeds (Percent)

	<u>ARRIUS</u> <u>1A</u>	<u>ARRIUS</u> <u>2B1</u>	<u>ARRIUS</u> <u>2B1A</u>	<u>ARRIUS</u> <u>2F</u>	<u>ARRIUS</u> <u>2K1</u>
Maximum stabilized	104	105	--	104	106
Maximum transient (5 sec.)	108	108 (20 sec.)	--	110 (20 sec.)	112 (20 sec.)

During starting, operation within the 70 to 85% range (ARRIUS 1A), and 75 to 85% range (ARRIUS 2B1, ARRIUS 2B1A and ARRIUS 2K1) is limited to 20 seconds.

100% = 6,016 rpm (ARRIUS 1A), 5,898 rpm (ARRIUS 2B1 and 2B1A), 6000 rpm (ARRIUS 2F and 2K1).

Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.

NOTE 2. Maximum Permissible Temperatures:A. Exhaust Gas T45(°C)

(measured with 4 doubles thermocouples on gas generator turbine diffuser)

	<u>ARRIUS</u> <u>1A</u>	<u>ARRIUS</u> <u>2B1</u>	<u>ARRIUS</u> <u>2B1A</u>	<u>ARRIUS</u> <u>2F</u>	<u>ARRIUS</u> <u>2K1</u>
2 1/2 minute rating	870	945	--	---	957
OEI continuous rating	---	895	--	---	905
30 minute rating	800	---	---	---	---
Takeoff rating	800	895	--	870	905
Maximum continuous	765	855	--	830	866
Rating					
Starting (unlimited)	765	810	--	800	810
Starting (limited to ≤5 sec.)	870	895	--	870	895

Refer to Installation Manual or Maintenance Manual for required action if limits are exceeded.

B. Oil (°C) (measured at location defined in the Installation Manual):

- Maximum operating: 80 to 110 depending on altitude and type of fuel (ARRIUS 1A), 110 (ARRIUS 2F, ARRIUS 2B1, ARRIUS 2B1A, and ARRIUS 2K1).
- Minimum for starting: between -50 and -30, according to oil specifications (refer to Installation Manual)
- Minimum for power application: between 0 and 10, according to oil specifications (refer to Installation Manual) (refer to Installation Manual for further details)

c. Fuel (°C) (at engine inlet):

- Maximum operating +50 (see NOTE 20) for ARRIUS 1A and ARRIUS 2F. For ARRIUS 2B1, 2B1A, 2K1, refer to the Installation Manual.
- Minimum for starting: The fuel temperature conditions for engine starting are specified in the Installation Manual.
- Use of anti-icing additive for fuel temperature: Refer to Installation/Operating Manual.

NOTE 3. Power Turbine Unit Torque Limits ft. lb. (Nm):

	ARRIUS 1A	ARRIUS 2B1	ARRIUS 2B1A		ARRIUS 2F	ARRIUS 2K1
			w/o TU45*	w/ TU45*		
- Max., 2 1/2 min OEI	501.5 (680)	582.7 (790)	586 (795)	628(852)	582.7 (790)	612.2 (830)
- Max. OEI continuous	---	545.8 (740)	--	443(600)	---	560.6 (760)
- Max. 30 min. OEI	464.7 (630)	---	---	---	---	---
- Max., takeoff	464.7 (630)	545.8 (740)	--	443(600)	479.5 (650)	560.6 (760)
- Max., max. continuous	413.0 (560)	486.8 (660)	--	369(500)	442.6 (600)	501.5 (680)
- Transient (20 sec.)	568 (770)	612.2 (830)	--	668(905)	554.7 (752)	708.8 (961)

* See Note 23

NOTE 4. Fuel and Oil Pressure Limits, psig (bar):A. Fuel: refer to Installation ManualB. Oil: (measured at engine pump outlet after filter).

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| | <u>ARRIUS 1A</u> | <u>ARRIUS 2B1/2B1A/ARRIUS 2F</u> | <u>ARRIUS 2K1</u> |
| - Maximum: | 145.1 (10) | 145.1 (10) | 217.7 (15) |
| refer to installation manual | | | |
| (refer to Installation Manual or Maintenance Manual if limit is exceeded). | | | |
| - Minimum: | <u>ARRIUS 1A</u> | <u>ARRIUS /2B1/2B1A/2F</u> | <u>ARRIUS 2K1</u> |
| at Ng equal or greater than | 65% : 24.7 (1.7) | 68% : 24.7 (1.7) | refer to installation manual |

NOTE 5. Maximum Permissible Air Bleed:

(P3 air bleed from centrifugal compressor plenum)

- Maximum air mass flow: 0.15 lb./sec. (ARRIUS 1A/2F), at take-off rating under standard sea level conditions (Refer to Installation Manual).

4.5% of engine inlet air mass flow (ARRIUS 2B1/2B1A)

5.48% of engine inlet air mass flow (ARRIUS 2K1).

- Power loss due to air bleed: refer to Installation Manual or Performance Booklet.

NOTE 6. Air Intake Requirements:

-The Arrius engines were not tested to evaluate the effects of foreign object ingestion. It is the Airframer's responsibility to protect the engine from foreign object ingestion through the design of the aircraft air intake. The aircraft manufacturer must substantiate that the aircraft air intake installation prevents foreign object ingestion by the engine, prior to the approval of the engine installation.

-The Arrius engines do not have anti-icing provisions. The Arrius 1A engine complies with the engine airworthiness requirements during icing conditions when Aerospatiale 335 N helicopter air intake Part Number (P/N) 335 A543533 is installed. The ARRIUS 2B1, 2B1A, 2F and 2K1 engines comply with the engine airworthiness requirements during icing conditions without the aircraft air intake installed. Therefore, for the ARRIUS 2B1, 2B1A, 2F and 2K1 engines, prior to the approval of the engine installation, the aircraft manufacturer shall substantiate that the installation of the air intake does not impact engine operation during icing conditions.

NOTE 7. Accessory Drive Provisions: ARRIUS 1A, 2B1, 2B1A and 2K1

Accessory-Drive	Direction* of Rotation	Reduction Ration* Nominal Rpm	Maximum Steady State Power Shp (kw)	Maximum Torque at Overload in. lb. (Nm)	Maximum Static Overhung Moment Allowable for Accessories in. lb. (Nm)
Gas generator spool ARRIUS 1A (Compressor and Turbine)	CCW**	NG = 54 117 (100%)	---	---	---
ARRIUS 2B1/2B1A/2K1	CCW**	--	---	---	---
Starter-Generator (1A)	CW	Ng x .21211 = 11,479	6.4 (4.8)	217 (25.0)	217 (25.0)
(2B1/2B1A/2K1)	CW	Ng x .2279 = 12,334	8 (6)	217 (25.0)	217(25.0) (2B1/2B1A) 60.8(7) (2K1)
Free turbine (Power Turbine) Spool (1A)	CW**	NTL = 45438	---	---	---
(2B1/2B1A)	CW**	NTL = 44038	---	---	---
(2K1)		NTL = 44009			
Main Output Shaft Drive (1A)	CW**	NTL x .13240 = 6,016	See NOTE 3	See NOTE 3	Refer to Installa- tion Manual
(2B1/2B1A)	CW**	NTL x .1339 = 5898	--	--	--
(2K1)	CW	NTL x .1363 = 6000	--	--	--
* Reference, facing engine accessory pad. ** Reference, aft looking forward.					

Accessory Drive Provisions: ARRIUS 2F

Accessory-Drive	Direction* of Rotation	Reduction Ration* Nominal Rpm	Maximum Steady State Power Shp (kw)	Maximum Torque at Overload in. lb. (Nm)	Maximum Static Overhung Moment Allowable for Accessories in.lb.(Nm)
Gas generator spool (Compressor and Turbine)	CCW**	NG =54117			
Starter - Generator	CW	NG x 0.2279 = 12334	5.7 kw	217(25.0)	217(25.0)
Power Turbine Spool	CW	NTL = 44009	---	---	---
Main Output Shaft Drive	CW	NTL x 0.1363 = 6000	---	---	---
* Reference, facing engine accessory pad. ** Reference, aft looking forward.					

NOTE 8. Engine Ratings: Based on calibrated test rig with performance under the following conditions:

- Static, sea level standard conditions (59°F, 29.92 in. Hg).
- No airbleed, no accessory power extraction.
- output shaft drive speed: 6016 rpm (ARRIUS 1A), 5898 rpm (ARRIUS 2B1/2B1A) 6000 rpm (ARRIUS 2F), 6360 rpm (ARRIUS 2K1).
- Heating value of fuel = 18,550 BTU/lb.

The indicated ratings are minimum final test performance of production and overhaul engines in accordance with engine acceptance test specification Number 0.319.00.940.0 (ARRIUS 1A), 0.319.00.958.0 (ARRIUS 2B1/2B1A), 0.319.00.959.0 (ARRIUS 2F), 0.319.00.962 (ARRIUS 2K1).

NOTE 9. Fuel Supply Requirements:

Fuel icing inhibitor additive is required as specified in the Installation/Operating Manual.

NOTE 10. Oil Systems: Refer to Installation Manual.

NOTE 11. Engine Monitoring Transmitters: Refer to Installation Manual.

NOTE 12. Electrical Equipment: Refer to Installation Manual.

NOTE 13. Engine Fire Detector:

Fire detectors provided on the engine: 4 (ARRIUS 1A), 2 (ARRIUS 2B1/2B1A), and 3 (ARRIUS 2F)

NOTE 14. Refer to Installation Manual for approved oil specification.

NOTE 15. Refer to Installation Manual for approved fuel and additive specification.

NOTE 16. Life-limited components are listed in DGAC-approved Chapter 5 or Airworthiness Limitation Chapter/Section of the Engine Maintenance Manual.

NOTE 17. Manuals required by FAR 33.4 and 33.5

	ARRIUS 1A	ARRIUS 2B1	ARRIUS 2B1A	ARRIUS 2F	ARRIUS 2K1
Installation/ Operating Number	x319 D66 0012	x319 L5 0012	x319 L5 0012	x319 L6 0012	x319 N1 0042
Maintenance Number	x319 D6 3002	x319 L5 3012	x319 L5 4512	x319 L6 3002	x319 N1 3002
Overhaul Number	x319 H6 5002	x319 L5 5002	x319 L5 5002	x319 L6 5002	x319 N1 5002

NOTE 18. Overhaul of engines is not authorized unless the appropriate overhaul manual is available; otherwise rebuilt engines utilizing new engine tolerances may be provided by the manufacturer.

- NOTE 19. FADEC box (ARRIUS 1A, 2B1, 2B1A and 2K1)
- A. Installation conditions
The box shall be installed in the airframe outside the fire zone.
Refer to Installation Manual for other installation conditions.
 - B. Lightning protection: refer to Installation Manual.
 - C. Electromagnetic interferences: tests carried out are specified in the Installation Manual.
 - D. Software
The software has been developed and tested and the corresponding documentation developed according to the recommendations of documents RTCA DO 178A/EUROCAE ED-12A to level 1.
- NOTE 20. ARRIUS 1A: Maximum fuel temperature when operating with restricted use-fuels is +25°C. Maximum operating duration with restricted use fuels is 25 hours.
- NOTE 21. The ARRIUS 1A and ARRIUS 2B1, 2B1A and ARRIUS 2K1 engines are restricted to twin-engine rotorcraft applications.
- NOTE 22. The ARRIUS 2B engine model is no longer in service and has been cancelled by the FAA from this data sheet as requested by the manufacturer.
- NOTE 23. TU45C is a major non-significant software modification, which mainly increases the ARRIUS 2B1A 2 1/2 minute OEI power rating and reduces the other power ratings. When modification TU45C is applied on 2B1A, it is identified as "ARRIUS 2B1A__1" on the engine identification plate.

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